Remarks

The claims have been amended so that claims 10, 23 have been cancelled, and 1,14 have been rewritten to comply with the Examiner's suggestion in the office action dated May 13, 2002, and reaffirmed telephonically June 12, 2003. Accordingly, claims 11-13 have been amended to depend from rewritten claim 1, and claims 24-26 have been amended to depend from rewritten claim 14. Claims 27-34 have been added.

Regarding the rejection of the amended claims under 35 USC 112, paragraph 1, the Examiner points specifically to a clause in the amended claims 1 and 14: "wherein each blade does not move relative to the other blades."

Applicant respectfully submits that there is, in fact, support for the statement, "wherein each blade does not move relative to the other blades." Attention is directed to the Summary of Invention, where the exposure device is described in part (pg. 2, lines 15-17; emphasis added): "...a shutter that includes (i) a frame defining an aperture toward which the energy beam is directed. (ii) a plurality of blades that are secured to the frame; and..."Further, the exact description of securing the blades to the frame is given in a fashion that would enable one of ordinary skill in the art to make the shutter device (pg. 4, lines 1-12; emphasis added):

> "Figure 2 illustrates a partial cross-sectional view of the shutter frame 8 showing the plurality of posts **12** supporting shutter blades **26**. The shutter frame should be sufficiently stiff to ensure that there would be little deformation due to the force of the tension created by the shutter blades. One method of attaching a shutter blade is to pass aluminum strips through the rectangular slots **24** in the side between the posts **12** and then winding the strips tightly around the posts. **Epoxy** is then applied to the flats created by the slots. Thereafter, the strip is held with the weight of the frame providing force that maintains the strip substantially planar as the **epoxy cures**. **Once the epoxy has cured, excess strip is trimmed off and the process is repeated until all the shutter blades are fabricated**. The shutter blades should be parallel to each other so that there is minimum attenuation of the radiation when the shutter device is in the open position."

Included in this response please find exemplary and readily available descriptions of epoxy resins as high-strength, permanent adhesives. The use of such an adhesive would ensure that the shutter blades are secured to the frame in a fashion in which they do not move. Further, that they do not move, and moreover do not move relative to one another is a correct description of their state after being glued by epoxy to the frame. This clearly distinguishes the invention from the cited art in which the shutter blades do move, and moreover move relative to one another, with terminology used in the cited art that is descriptive of blade movement. Examples of such terminology clearly indicating blade movement can be found in the cited art; e.g. an adjustable slit device comprising "blades pivotally attached" (McCullough, US 6,097,474; see especially abstract, detailed description, and claims), or a camera shutter blade device comprising "blades disposed slidably" or a support mechanism for "rotatably supporting" a first and second group of two blades. (Nakamori, US 5,043,753; see especially abstract, detailed description and claims).

Claims 1-26 stand rejected under 35 USC 112, paragraph 2, for indefiniteness of the stated clause, "wherein each blade does not move relative to each other." Applicant submits that the detail given in the written part of the specification clearly shows that the fashion in which securing the blades to the frame results in stationary fixturing of the blades, and the blades not movable relative to one another thereby (see above). Further, the clause distinguishes the invention over the cited art, since one element of the instant application includes blades secured to a frame in a fashion that they themselves do not move, unlike the cited art shutters (see examples given above from McCullough and Nakamori).

Concerning the rejection of claims 1-2, 11 and 14-15, 24 under 35 USC 102(e) over McCullough, US 6,097,474 (hereafter '474), the following is quoted from the Action (emphasis added):

"...McCullough discloses an exposure device having an illumination system (10) for generating an energy beam and a shutter (20) including a frame (28) defining an aperture and a plurality of rectangular blades which are secured to the frame and parallel to each other (see fig. 3) and means for moving the blades to block or allow energy to travel through the aperture (see col. 4 lines 60 to column 6 line 51; and col. 13, lines 27-30)."

In reference to the underlined portion quoted from the Action, Applicant respectfully submits that the McCullough invention does not describe a frame defining an aperture. Specifically, frame **28** of the adjustable slit device **20** of McCullough is not an aperture. The aperture referred to in the McCullough invention is element **12** of Fig. 1, and is defined in column 3, lines 49-53 as follows:

"The adjustable slit device **20** has a plurality of adjustable blades that are selectively inserted into the illumination profile **10** along a longitudinal length of the rectangular illumination field or slit **12**."

Element **28**, the frame, is subsequently identified as a component of the adjustable slit device **20**, and is clearly distinct from element **12**, the slit, which is the aperture that the adjustable slit device **20** acts upon to adjust the illumination accordingly. By definition a slit is an aperture, but a frame is not an aperture unless otherwise designated. It is worthy to clarify this point, since the instant application specifically defines the frame of the inventive device to be the aperture (see above), and that is an inventive component of the described device of the instant application that clearly distinguishes it from McCullough.

Additionally, the Action continues to disclose reasoning for the rejection of the instant application under 35 USC 102(e), citing McCullough as follows:

"...'Push rods 34 are ***independently*** adjusted by turning nuts 39' (see col. 4, lines 52-56 and fig. 3). This provides a clear suggestion that it would have been obvious to one having ordinary skill in the art at the time the invention was made to displace each blade independently for adjusting the illumination energy through the shutter."

Applicant agrees with the Examiner on this point, and wishes to point out respectfully that the issue of the independent movement of the blades themselves in the cited art is another element that distinguishes the instant application from the obvious construction of displacing each blade independently, as written in the Action. The following is quoted from the instant application (pg. 3, lines 20-23; please refer also to Figs. 1 and 2; emphasis added):

"The shutter frame 8 supports a plurality of shutter blades (not shown) which can intercept radiation (e.g. energy beam) as the frame rotates about center axis x where the frame is attached to the shaft 9 which functions as a pivot."

Since the instant invention has blades that are fixedly secured to the frame, and cannot be independently displaced, then the shutter blades of the instant application are distinct from the obviousness described in the Action. The only movement of the blades is as a function of the movement of the frame which is the aperture that is moved in the instant invention, as quoted above.

In summary, McCullough describes a plurality of blades that are pivotally attached together in an adjustable slit device, and the blades themselves are moved to act on a separate aperture to adjust an energy beam accordingly. In the inventive device described in the instant application, a frame acting as an aperture has blades which are fixedly secured to the frame (aperture) in a

fashion that the blades themselves cannot move. The frame (aperture) is then rotated, subsequently moving the plurality of fixedly secured blades into a position where they attenuate an energy beam, or alternatively allow its passage. There is nothing in McCullough, express or inherent, that teaches using a frame as an aperture onto which blades are fixedly mounted, and then rotation of the frame (aperture) itself thereby effecting shuttering. Necessarily, given the critical distinctions of the instant invention over McCullough as outlined in detail in the above, Applicant submits that there is additionally nothing obvious about the instant application in light of McCullough. In fact, the use of shutter blades which themselves move over a separate aperture teaches away from a frame that is an aperture, in which blades are secured in a fashion that they themselves cannot move.

Regarding the rejection of claims 4-9, 12-13 and 17-22, 25-26 as obvious over McCullough or Nakamori, under 35 USC 103(a). It is stated in the action that McCullough and Nakamori disclose shutters comprising all the basic structures as set forth in the instant claims. The Examiner rejects the dependent claims identified under the proviso: "...it has been held that where the general conditions of a claim are disclosed in the cited art, discovering optimum or workable ranges involves only routine skill in the art."

An argument has been set forth regarding distinguishing the instant application over McCullough, and has been summarized in the above. Applicant respectfully submits that there is no foundation for rejection of the dependent claims under the stated proviso over McCullough, since Applicant holds that the claims on which the rejected dependent claims of the instant invention depend describe an invention that is clearly distinguished from McCullough, and further that McCullough teaches away from the design of the instant application, as stated above.

Concerning obviousness of the invention of Nakamori, '753, the following is taken from column 1, lines 6-10 (emphasis added):

"The present invention relates to a shutter blade device for use as a shutter of a compact camera or an iris stop, and more specifically relates to a device of the type having a plurality of blades disposed slidably over an aperture in opposite directions."

The moving blades which themselves slide over to cover a separate aperture make the device described by Nakamori distinctly different than the device claimed in the instant invention. Nakamori describes a plurality of blades that themselves move slidably, and thereby are moved to act on a separate aperture. This is distinguished from the inventive device described in the instant application, teaching a frame acting as an aperture having blades which are fixedly secured to the frame (aperture) in a fashion that the blades themselves cannot move, and subsequently rotating the frame by which the plurality of fixedly secured blades attenuate an energy beam. The use of shutter blades which themselves move over a separate aperture teaches away from a frame that is an aperture, in which blades are secured in a fashion that they themselves cannot move. Applicant respectfully submits that there is no foundation for rejection of the dependent claims under the stated proviso over Nakamori, since Applicant holds that the claims on which the rejected dependent claims of the instant invention depend describe an invention that is clearly distinguished from Nakamori.

Finally, with respect to the rejection of claim 3 as rejected under 35 USC 103(a) over McCullough in view of Styrnol, Applicant submits that since the invention of McCullough does not describe a frame acting as an aperture from which shutter blades are stationarily fixtured, that it cannot be combined with Styrnol to suggest the claimed invention. Applicant submits that no prima facie case of obviousness has been met to reject claim 3 over McCullough in view of Styrnol.

In view of the above, it is submitted that the claims in this application are in condition for allowance. Accordingly, reconsideration and allowance of the claims as amended are requested.

Respectfully submitted,

Date: 25 July 2003

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Inventor: Terry A. Johnson
Appln. No.: 09/610,239
Confirm. No.: 4991
Filed: July 5, 2000
Title: IN-VACUUM EXPOSURE SHUTTER

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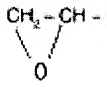
Guide To Composites

Epoxy Resins

The large family of epoxy resins represent some of the highest performance resins of those available at this time. Epoxies generally out-perform most other resin types in terms of mechanical properties and resistance to environmental degradation, which leads to their almost exclusive use in aircraft components. As a laminating resin their increased adhesive properties and resistance to water degradation make these resins ideal for use in applications such as boat building. Here epoxies are widely used as a primary construction material for high-performance boats or as a secondary application to sheath a hull or replace water-degraded polyester resins and gel coats.

The term 'epoxy' refers to a chemical group consisting of an oxygen atom bonded to two carbon atoms that are already bonded in some way. The simplest epoxy is a three-member ring structure known by the term 'alpha-epoxy' or '1,2-epoxy'. The idealised chemical structure is shown in the figure below and is the most easily identified characteristic of any more complex epoxy molecule.

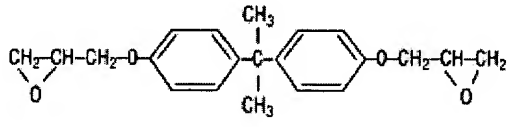


Idealised Chemical Structure of a Simple Epoxy (Ethylene Oxide)

Usually identifiable by their characteristic amber or brown colouring, epoxy resins have a number of useful properties. Both the liquid resin and the curing agents form low viscosity easily processed systems. Epoxy resins are easily and quickly cured at any temperature from 5°C to 150°C, depending on the choice of curing agent. One of the most advantageous properties of epoxies is their low shrinkage during cure which minimises fabric 'print-through' and internal stresses. High adhesive strength and high mechanical properties are also enhanced by high electrical insulation and good chemical resistance. Epoxies find uses as adhesives, caulking compounds, casting compounds, sealants, varnishes and paints, as well as laminating resins for a variety of industrial applications.

Epoxy resins are formed from a long chain molecular structure similar to vinylester with reactive sites at either end. In the epoxy resin, however, these reactive sites are formed by epoxy groups instead of ester groups. The absence of ester groups means that the epoxy resin has particularly good water resistance. The epoxy molecule also contains two ring groups at its centre which are able to absorb both mechanical and thermal stresses better than linear groups and therefore give the epoxy resin very good stiffness, toughness and heat resistant properties.

The figure below shows the idealised chemical structure of a typical epoxy. Note the absence of the ester groups within the molecular chain.



Epoxies differ from polyester resins in that they are cured by a 'hardener' rather than a catalyst. The hardener, often an amine, is used to cure the epoxy by an 'addition reaction' where both materials take place in the chemical reaction. The chemistry of this reaction means that there are usually two epoxy sites binding to each amine site. This forms a complex three-dimensional molecular structure.

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